

Amendment under 37 C.F.R. § 1.116
Serial No. 10/731,163
Attorney Docket No. 032154

REMARKS

Claims 6-9, 24 and 27-30 are pending. Claims 6, 8-9, 27 and 28 have been amended herein. Support for the amendments is detailed below.

Applicants' Response to the Rejection under 35 U.S.C. §112

Claims 6-8, 24 and 27 stand rejected under 35 U.S.C, §112, first paragraph. The Office Action asserts that the claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one of skilled in the art that the inventors had possession of the claimed invention at the time of filing. Specifically, the Office Action maintains that the limitation of "a specified region" is too broad to be supported by the disclosure of the specification. In response thereto, applicants have amended claims 6, 8 and 27 by more distinctly describing the specified region as a relatively weak region as discussed in the Office Action. In light of these amendments, applicants respectfully request favorable reconsideration.

Applicants' Response to the Rejection under 35 U.S.C. §102(e)

Claims 6, 9, 24 and 27-28 and 30 stand rejected under 35 U.S.C, §102(e) as being anticipated by US Pat. No. 6,507,044 issued to Santana, Jr. et al. supported by webpage "Technical Sales Solution, LLC." In response thereto, applicants have amended the claims to more distinctly claim the subject matter regarded as the invention. Specifically, applicants have amended claim 6 to include the limitations that "the sample surface has a partial region which is providing a relatively weak region against dielectric breakdown

being caused by irradiating the electron beam; and a controller for controlling the electron beam so as not to be irradiating the weak region, wherein the weak region has a gate oxide film of a transistor formed thereon and an electric connection with the region of the gate oxide film.” Applicants respectfully submit that these features are not taught or suggested in any of the cited references.

The Office Action states at item 11 that:

“As per claim 9¹, Santana, Jr. et al. disclose the specified region being weaken region (see col. 3, lines 13-15; col. 9, lines 32-40)”

Applicants respectfully traverse. Column 3, lines 13-15 of Santana et al. states “the area of interest for examination may be buried beneath another portion of the sample. For example, it may be desirable to examine the gate dielectric of a transistor that has failed electrical testing, to look for pinholes or thickness non-uniformities in the dielectric”. These disclosures are not related to a “weak region” against dielectric breakdown being caused by irradiating the electric beam. The reference refers to the difficulties of the examination by SEM of the gate dielectric of a transistor that is buried beneath another portion of the sample.

Also, column 9, lines 32-40 of Santana et al. state:

“Similarly, increase in electron beam energy and/or decreases in beam spot size may increase etch rate while reducing selectivity. In embodiments for which electron beam 20 is supplied by an SEM electron column, the size of the scanned area is determined by the magnification, with larger magnifications producing smaller scanned areas. In the case of

¹Applicants note that the limitation of a weak region of claim 9 has been incorporated into amended claim 6.

the DualBeam 820, for example, the area scanned by the electron beam (i.e., the field of view), thereby the area over which etching occurs in the presence of ten XeF₂ gas, may typically have dimensions on the order of ten microns on a side”.

Again, these portions do not disclose or suggest the “weak region.” The reference refers to the etching conditions or beam spot size. Accordingly, applicants respectfully submit that the features of claim 6 are not taught nor suggested by Santana et al.

In regard to claims 27, 28 and 30, applicants have amended claims 27 and 28 to include the limitation of “a controller for controlling the electron beam with a small dose level of the electron beam for a relatively weak region against dielectric breakdown being caused by irradiating the electron beam” and claim 30 to include the limitation of “controlling said irradiation of the electron beam so that a small dose level of the electron beam is applied to said respective weak region so as to evaluate the surface of the sample.” Applicants respectfully submit that neither of these features are taught nor suggested by any of the cited references.

The Office Action states at item 13 that: “As per claims 27 and 30, Santana et al. disclose the beam has small dose level (col. 9, lines 6-15).”

Applicants respectfully traverse. Column 9, lines 6-15 of Santana et al. states:

“The selectivity of the electron beam controlled etch is illustrated by the removal of polysilicon layer 14 in the region scanned by electron beam 20, while dielectric 12 remains intact. It should be noted that thin dielectrics such as dielectric 12 exposed by the method recited herein are believed to be best observed by SEM when low electron beam energies of about 1kV are used for imaging. This usefulness of low imaging energies

for observation of thin dielectrics is believed to be related to penetration depth and/or charging effects of the imaging electrons”.

Here, the reference discloses that the low electron beam energies of about 1 kV are to be used for imaging for thin dielectric. However, applicants respectfully submit that a person skilled in the art does not combine the terms “a small dose level” and “a low electron beam energy”. That is, “dose” is an irradiated charge per unit area and the dimension of which is Qulomb/cm² and calculated as irradiated current density (A/cm²) X irradiated time (sec). On the other hand, the dimension of the beam energy is eV or keV. They are different ideas and, thus, the former does not suggest the latter or vice versa.

Further, in the present invention, “small dose level” is used to avoid the dielectric breakdown. In Santana et al, however, “low electron beam energy” is adopted to appropriate the penetration of the imaging electrons into the sample. Thus, the terms are completely different in their objects, means for accomplishing the objects and the advantageous effects derived there from.

In item 14, the Office Action states that:

“As per claim 28, Santana et al disclose the region is weak (col. 9, lines 10-15), which has a gate oxide film of a transistor formed thereon (see for example col. 7, lines 41-49)”.

However, as discussed above, column 9, lines 10-15 of Santana et al does not teach nor suggest “weak region.” Also, column 7, lines 41-49 does not refer to “a gate

oxide film of a transistor formed thereon” nor is it a “weak region”. Accordingly, applicants respectfully submit that Santana et al does not teach or suggest the features of the claimed invention of claims 27, 28 and 30.

Applicants’ Response to the Rejection under 35 U.S.C. §103(a)

Claim 7 stands rejected under 35 U.S.C, §103(a) as being unpatentable over US Pat. No. 6,507,044 issued to Santana, Jr. et al. supported by webpage “Technical Sales Solution, LLC” as applied to claim 6 above and further in view of U.S. Pat. No. 5,389,787 issued to Todokoro et al. Applicants respectfully submit that claim 7 has been addressed in light of its dependency to amended claim 6 discussed above.

Claims 8 and 29 stands rejected under 35 U.S.C, §103(a) as being unpatentable over US Pat. No. 6,507,044 issued to Santana, Jr. et al. supported by webpage “Technical Sales Solution, LLC” as applied to claim 6 above and further in view of applicants admitted prior art “A Practical Electron Lithography System, IEEE Transactions on Electron Devices, vol.-ED-22, No. 6, July, 1975, pp.385-391” (hereinafter “AAPR”) in pg. 29, lines 6-8 of the present specification.

In regard to claim 8, applicants respectfully submit that claim 8 has been addressed in light of its dependency to amended claim 6 discussed above.

In regard to claim 29, applicants respectfully submit that the claim contains limitations which are not taught or suggested by any of the cited references. Specifically, the claim includes the features of “specifying a partial region on said sample surface

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which is a relatively weak region against dielectric breakdown being caused by irradiating the electron beam, and controlling the electron beam so as not to be irradiated onto said weak region” These features are not taught nor suggested in any of the cited references.

The Office Action states in items 21 that: “Santana et al disclosed the claimed invention except for beam blanking such that the beam so as not to be irradiated onto the weak region...” and “... AAPR teaches that blanking is common and within the level of ordinary skill in the scanning electron beam apparatus art.”

However, as discussed above in regard to the rejection of claim 6, Santana et al. does not disclose nor suggest the “weak region against dielectric breakdown being caused by irradiating the electron beam.” Further, applicants did not cite “AAPR” as it discloses “blanking a weak region.” Thus, applicants respectfully submit that the above limitations of claim 29 are not disclosed nor suggested in Santana et al or “AAPR.”

In view of the aforementioned amendments and accompanying remarks, Applicants submit that that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants’ undersigned attorney to arrange for an interview to expedite the disposition of this case.

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If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,
WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP

A handwritten signature in black ink, appearing to read "Michael J. Caridi", with a large, sweeping flourish extending to the right.

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